

## Claims

1. A process for utilisation of an ammonia-containing waste gas stream from a semiconductor processing step, comprising decomposing ammonia contained in the waste gas stream into hydrogen and nitrogen, passing the gas stream so obtained through a hydrogen separator in order to separate hydrogen gas therefrom, purifying the separated hydrogen gas in a purifier and using the purified hydrogen gas in semiconductor processing.
2. A process according to claim 1, in which the semiconductor processing step is gallium nitride epitaxy, the purified hydrogen gas being recycled for use therein.
3. A process according to claim 1 or claim 2, in which the hydrogen separator is a pressure swing adsorption system.
4. A process according to any one of the preceding claims, in which the purifier is a palladium purifier.
5. A process according to any one of the preceding claims, in which the ammonia decomposition step comprises contacting the ammonia with a hot catalyst.
6. A process according to any of the preceding claims, in which the hydrogen gas effluent from the hydrogen separator has a purity of at least 99%.
7. A process according to any one of the preceding claims, in which the purified hydrogen effluent from the purifier has a purity of at least 99.99%.
8. A process according to any one of the preceding claims, in which the hydrogen gas effluent from the hydrogen separator is combined with fresh hydrogen before it is purified in the purifier.

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9. A process according to any one of the preceding claims, in which the purified gas effluent from the purifier is combined with further hydrogen and the combined hydrogen gas stream is utilised in semiconductor processing.

10. An apparatus for manufacture of semiconductor products, having a semiconductor processing device and a waste gas recovery loop for recovery of hydrogen, the waste gas recovery loop comprising an ammonia cracking device for receiving waste gases from the semiconductor processing devices and decomposing ammonia therein to form a cracking device effluent containing nitrogen and hydrogen, a hydrogen separator for separation of hydrogen from the ammonia cracking device effluent, a purifier for purifying the separated hydrogen, and a recycle line for recycling purified hydrogen from the purifier to the semiconductor processing device.

11. An apparatus according to claim 10, in which the semiconductor processing device is a gallium nitride epitaxy chamber.

12. An apparatus according to claim 10 or claim 11, in which the hydrogen separator is a pressure swing absorption system.

13. An apparatus according to any one of claims 10 to 12, in which the hydrogen purifier is a palladium purifier.